TARGET MATHEMATICS
THE EXCELLENCE KEY
AGYAT GUPTA (M.Sc., M.Phil.)

CODE:- AG-4-1899 **REG.NO:-TMC -D/79/89/36**

General Instructions :

1. All question are compulsory.
2. The question paper consists of 29 questions divided into three sections A,B and C. Section – A comprises of 10 question of 1 mark each. Section – B comprises of 12 questions of 4 marks each and Section – C comprises of 7 questions of 6 marks each .
3. Question numbers 1 to 10 in Section – A are multiple choice questions where you are to select one correct option out of the given four.
4. There is no overall choice. However, internal choice has been provided in 4 question of four marks and 2 questions of six marks each. You have to attempt only one lf the alternatives in all such questions.
5. Use of calculator is not permitted.
6. Please check that this question paper contains 5 printed pages.

- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

Pre-Board Examination 2011 -12

Time : 3 Hours	अधिकतम समय : 3
Maximum Marks : 100	अधिकतम अंक : 100
Total No. Of Pages :5	कुल पृष्ठों की संख्या : 5

CLASS – XI CBSE MATHEMATICS

PART – A

Q.1 Prove that: $8\cos^3\frac{\pi}{9} - 6\cos\frac{\pi}{9} = 1$.

Q.2 Find a positive value of m for which the coefficient of x^2 in the expansions of $(1+x)^m$ is 6 . Ans: $^mc_2 = 6 \Rightarrow m^2 - m - 12 = 0 \Rightarrow m = 4 \& m \neq 3$

CLASS – XI CBSE MATHEMATICS

Q.3 How many words can be formed by arranging the letters of the word '**BILASPUR**' do not change the relative position of vowels & consonants? Ans 3!5!=720

Q.4 Solve the equation : $x^2 + 3ix + 10 = 0$. Ans x = 2i , -5 i

Q.5 If $T_n = \frac{2T_{n-1}+3}{4}$ find T_2 where $T_1 = 3$. Ans : $T_2 = \frac{9}{4}$

Q.6 Express as a factorial $1\times3\times5\times$ .... $\times15$ Ans $\frac{16!}{2^8 8!}$

Q.7 Find the value of k for which the line (k -3) x – $(4-k^2)y + k^2 - 7k + 6 = 0$ is passing through origin . Ans $(k-6)(k-1) = 0 \Rightarrow k = 6;1$

Q.8 Let $A = \{1,2\}, B = \{1,2,3,4\}, C = \{5,6\}$ Find $A \times (B \cap C)$. $A \times (B \cap C) = \{\}$ or φ

Q.9 For what point on the parabola $y^2 = 16x$ is the abscissa equal to twice the ordinate? Ans. . (0 , 0) & (64,32 }

Q.10 Find the general solution of sec x = $\frac{2}{\sqrt{3}}$. Ans. . $2n\pi \pm \frac{\pi}{6}$

PART – B

Q.11 Find, the 4th term from the end in the expansion of $\left(\frac{3}{x^2} - \frac{x^3}{6}\right)^7$. Ans:

$$T_5 = {}^7c_4\left(\frac{3}{x^2}\right)^{7-4}\left(\frac{-x^3}{6}\right)^4 = \frac{35x^6}{48}$$

Q.12 Prove that: $\cos 6\theta = 32\cos^6\theta - 48\cos^4\theta + 18\cos^2\theta - 1$.

Q.13 Find the sum of the following series up to *n* terms 5 + 55 +555 + ... Ans :

$$\frac{5}{9}\left[(10 + 10^2 + 10^3 + \ldots\ldots \text{ .nterm }) - n\right] \Rightarrow \frac{5}{81}\left[10^{n+1} - 9n - 10\right]$$

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Q.14 Find the domain and range of $f(x)=\dfrac{x^2-3x+2}{x^2+x-6}$. $D_f = R-\{2,-3\}$, $R_f = R-\left\{\frac{1}{5},1\right\}$

OR

Find the domain and range of $f(x)=\sqrt{25-x^2}$. **Ans** $D_f=[-5,5]\ or\ -5\le x\le 5;\ R_f=[0,5]\ or\ Range=\{y: y\in R, 0\le y\le 5\}$

Q.15 A circle of radius 2 lies in the first quadrant and touches both the axes. Find the equation of the circle with centre at (6,5) and touching the above circle externally. Ans $(x-6)^2+(y-5)^2=3^2$

Q.16 From a pack of 52 cards , 3 cards are drawn at random . Find the probability that there will be at least one king amoung them . Ans: Required probability = at least one king = 1 – none king = $1-\dfrac{{}^{48}c_3}{{}^{52}c_3}=\dfrac{1201}{5525}$ OR Required probability = one king & two none king + two king & one none king + all king $=\dfrac{{}^4c_1\times{}^{48}c_2}{{}^{52}c_3}+\dfrac{{}^4c_2\times{}^{48}c_1}{{}^{52}c_3}+\dfrac{{}^4c_3\times{}^{48}c_0}{{}^{52}c_3}=\dfrac{1201}{5525}$

Q.17 Prove the mathematical induction: $2.7^n+3.5^n-5$ is divisible by 24 for all $n\in N$.

Q.18 Prove that $P(n,r)=P(n-1,r)+rp(n-1,r-1)$.

Q.19 Prove that : $\tan 4\theta=\dfrac{4\tan\theta-4\tan^3\theta}{1-6\tan^2\theta+\tan^4\theta}$.

Q.20 Evaluate $\lim\limits_{x\to\pi/2}\dfrac{1-\sin^3 x}{\cos^2 x}$. Ans $\frac{3}{2}$

OR

CLASS – XI CBSE MATHEMATICS

Using first principal find the derivative of $\cos\sqrt{x}$ w.r.to x . Ans $\dfrac{-\sin\sqrt{x}}{2\sqrt{x}}$

Q.21 Convert the complex number $\dfrac{i-1}{\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}}$. Ans : $\sqrt{2}\left(\cos\frac{5\pi}{12}+i\sin\frac{5\pi}{12}\right)$

OR

If α and β are different complex numbers with $|\beta|=1$, then find $\left|\dfrac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|$. Ans : 1

Q.22 Find equation of the line passing through the point (3.4) and cutting off intercepts on the axes whose sum is 14 . Ans: x + y = 7 & 4x + 3 y = 24 .

OR

Find the ratio in which the line segment joining the points (4, 8, 10) and (6, 10, – 8) is divided by the YZ-plane. Also find the point of division . Ans Externally are in the ratio 2 : 3 $\left(\frac{4+6k}{k+1},\frac{8+10k}{k+1},\frac{10-8k}{k+1}\right)\therefore\frac{4+6k}{k+1}=0\Rightarrow k=\frac{-2}{3}$ point of division is $(0,4,46)$

PART – C

Q.23 How many litres of water will have to be added to 1125 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% acid content? Ans : 25% of (1125 + x) < 45 % of 1125 < 30 % of (1125 + x) ; $562.5<x<900$

Q.24 If all the letters of the word **"AGAIN"** be arranged as in a dictionary, what is the 25th, 49th & 50th word? Ans 25th = GAAIN 49th = NAAGI & 50TH = NAAIG (Ans. 3600

Q.25 Find the equation of the hyperbola whose foci are (6, 4) and (-4, 4)

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	and eccentricity is 2 . Ans. $12x^2-4y^2-24x+32y-127=0$
Q.26	Find the sum : 1+ 5 + 13 + 29 +…… . $istdiff:1,4,8,16,....;T_n=a.2^{n-1}+b;T_n=4\times2^{n-1}-3$ OR If $s_1, s_2, s_3 \ldots\ldots s_m$ are the sum of n terms of an A.P. whose first terms are 1,2,3…m and common diff are 1, 4, 7 …(3m-2) respectively. Show that $s_{1+}s_2+\ldots\ldots\ldots\ldots.+s_m=\frac{mn}{4}(3mn-n-m+3)$. Ans $:S_1=\frac{n}{2}(n+1);S_2=\frac{n}{2}(4n);S_3=\frac{n}{2}(7n-1)$ $S_1+S_2+S_3+.....S_n=\frac{n}{2}[(n+1)+(4n)+(7n-1)+.....nterm]$ $\frac{n}{2}\left[\frac{m}{2}\{2(n+1)+(m-1)(3n-1)\}\right]=\frac{mn}{4}(3mn-n-m+3)$
Q.27	Calculate the mean, variance and standard deviation for the following distribution :

CI	30-40	40-50	50-60	60-70	70-80	80-90	90-100
F	3	7	12	15	8	3	2

Ans Mean = 62, Variance = 201, SD= $(\sigma)=\sqrt{201}=14.17$

Q.28	If the 3rd,4th and 5th terms in the expansion of $(x+a)^n$ are 84,280 and 560 respectively, find x, a and n. Ans: $T_3=84={}^nc_2x^{n-2}a^2;T_4=280={}^nc_3x^{n-3}a^3;T_5=560={}^nc_4x^{n-4}a^4$ $x=1;a=2;n=7$
Q.29	A committee of 5 has to be formed from 6 boys and 4 girls. In how many ways can this be done when the committee consists of:(i) at least two girls are included ?(ii) at most 2 girls are included ? $(i)^4c_2\times{}^6c_3+{}^4c_3\times{}^6c_2+{}^4c_4\times{}^6c_1=120+60+6=186$

	$(ii)^6c_5+{}^6c_4\times{}^4c_1+{}^6c_3\times{}^4c_2=6+60+120=186$
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	A MAN WHO DOESN'T TRUST HIMSELF CAN NEVER TRULY TRUST ANYONE ELSE

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